

Haley & Aldrich, Inc.
9040 Friars Road
Suite 220
San Diego, CA 92108-5860



Tel: 619.280.9210
Fax: 619.280.9415
HaleyAldrich.com

20 August 2009
File No. 28882-638

Los Angeles Regional Water Quality Control Board
320 W. 4th Street, Suite 200
Los Angeles, California 90013

Attention: Ms. Ana Townsend

Subject: Building 1/36 Soil Vapor Sampling Work Plan
The Boeing Company
Former C-6 Facility, Building 1/36 Area
Los Angeles, California

Haley & Aldrich, Inc. prepared this work plan on behalf of The Boeing Company to install and sample three soil vapor probes at the Former C-6 Facility, Building 1/36 Area (Site), located near the northwest corner of Normandie Avenue and Knox Street, in the City of Los Angeles, California.

BACKGROUND

Previous investigations at the Site indicated the presence of volatile organic compounds (VOCs) in deep soil at concentrations requiring remediation. As a result, and under the direction of the Los Angeles Regional Water Quality Control Board (LARWQCB), a soil vapor extraction (SVE) system was installed and started in 2002. A review of the SVE system's operational and soil sampling data in mid-2008 suggested that remediation of deep soil had been successfully completed. The system was therefore shutdown in June 2008 and rebound monitoring was conducted. The results of this rebound monitoring indicated that soil vapor concentrations experienced unanticipated levels of rebound, predominantly due to vinyl chloride. Given that previous investigations and historical SVE system operational data did not identify vinyl chloride as a target compound for remediation, and that vinyl chloride is being generated in groundwater related to VOC biodegradation processes, it appears that the vapor rebound was related to groundwater offgassing and not deep soil impacts. The SVE system was subsequently restarted in August 2008 and has operated continuously since then. In order to evaluate offgassing and associated migration of vapors through the soil column, this work plan proposes to shutdown the SVE system and collect soil vapor samples at multiple depths over time.

APPROACH

Three semi-permanent vapor probes will be installed at the locations shown in Figure 1. Two locations along the eastern side of the building will be installed with sample points at 10, 25, and 40 feet below ground surface (bgs). Note that groundwater is encountered at approximately 55 to 60 feet bgs in this area.

The SVE system will then be shutdown and an initial round of vapor sampling will be conducted on the same day (no sooner than four hours after shutdown), followed by a second round approximately three months later. The results will be shared with the LARWQCB, along with an evaluation of potential next steps. The SVE system will remain off during this rebound evaluation period. The installation and sampling will be conducted in accordance with the following Department of Toxic Substance Control (DTSC) and the LARWQCB guidance documents and recent workshops:

- California Environmental Protection Agency DTSC, 2005, "Interim Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air," 15 December 2004 (revised 7 February 2005) and the associated response to public comments dated 1 June 2008 (collectively referred to as the DTSC Vapor Intrusion Guidance Manual);
- DTSC/LARWQCB, 2003. "Advisory - Active Soil Gas Investigations." 13 January; and
- Discussions of proposed guidance revisions during the DTSC/LARWQCB vapor intrusion workshop held on 9 and 10 June 2008.

The location of the soil vapor probes were chosen based on the following four criteria:

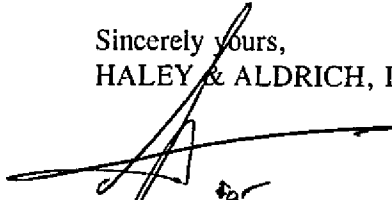
1. As close to the building as possible;
2. Near the areas of highest historical VOC vapor concentrations, as shown on Figure 1;
3. Near the areas of highest recent VOC vapor concentrations, as shown on Figure 1; and
4. Near the areas of highest concentrations in groundwater for trichloroethene, 1,1-dichloroethene, and vinyl chloride, as shown on Figures 2 and 3, provided by Avocet Environmental, Inc. and CDM, respectively.

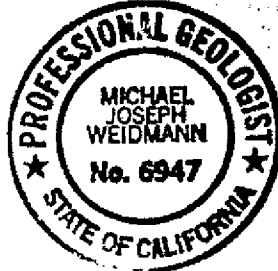
The probes will be allowed to equilibrate for a minimum of 48 hours following installation and prior to purging and sampling. A leak detection test will also be conducted at each probe. Sampling of the shallow vapor probes will utilize a default of three purge volumes. Samples will be collected in Summa canisters and submitted to a stationary analytical laboratory. Each sampling event will include the collection of a method blank and duplicate. Samples will be analyzed using EPA Method TO15, which includes the LARWQCB 23 primary target compounds as well as Site-specific compounds such as methyl iso-butyl ketone and methyl ethyl ketone. Detection limits for all analytes will be below California Human Health Screening Levels (CHHSLs) where applicable. A list of the target compounds along with the reporting limits is provided in Table I (CDM 2009) along with the appropriate residential and commercial/industrial CHHSLs.

The Boeing Company
20 August 2009
Page 3

Please contact the undersigned should you have any questions concerning this work plan.

Sincerely yours,
HALEY & ALDRICH, INC.


Joe Weidmann, P.G.
Senior Geologist



Enclosures:

- Table I – List of Soil Gas VOCs by EPA Method TO15
- Figure 1 – Historical and Recent VOC Vapor Concentrations and Proposed Soil Vapor Sample Locations
- Figure 2 – Trichloroethene and 1,1-Dichloroethene Concentrations in Groundwater and Proposed Soil Vapor Sample Locations
- Figure 3 – Vinyl Chloride Concentrations in Groundwater and Proposed Soil Vapor Sample Locations

c: The Boeing Company, Attn: Mr. Robert Scott

G:\28882 C-6\638\VP Sampling WP\2009_0820_HAI_C6VPSamplingWP_F.doc

**HALEY &
ALDRICH**

TABLE I
LIST OF SOIL GAS VOCs BY EPA METHOD TO15
FORMER C-6 FACILITY
LOS ANGELES, CALIFORNIA

Air Toxics T015 List of VOCs	RLs (µg/m3)	Shallow Soil Gas Human Health Screening Levels (µg/m3)	
		Residential Land Use	Commercial/ Industrial Land Use
1,1,1-Trichloroethane	2.8	9.91 E+05	2.79 E+06
1,1,2,2-Tetrachloroethane	3.5		
1,1,2-Trichloroethane	2.8		
1,1-Dichloroethane	2.0		
1,1-Dichloroethene	2.0		
1,2,4-Trichlorobenzene	15.1		
1,2,4-Trimethylbenzene	2.5		
1,2-Dichlorobenzene	3.0		
1,2-Dichloroethane	2.0	4.96 E+01	1.67 E+02
1,2-Dichloropropane	2.3		
1,3,5-Trimethylbenzene	2.5		
1,3-Butadiene	1.1		
1,3-Dichlorobenzene	3.0		
1,4-Dichlorobenzene	3.0		
1,4-Dioxane	1.8		
2,2,4-Trimethylpentane	2.3		
2-Butanone (MEK)	1.5		
2-Hexanone	8.3		
2-Propanol	5.0		
3-Chloroprene	6.4		
4-Ethyltoluene	2.5		
4-Methyl-2-pentanone (MIBK)	2.1		
Acetone	4.8		
alpha-Chlorotoluene	2.6		
Benzene	1.6	3.62 E+01	1.22 E+02
Bromodichloromethane	3.4		
Bromoform	5.3		
Bromomethane	2.0		
Carbon Disulfide	1.6		
Carbon Tetrachloride	3.2	2.51 E+01	8.46 E+01
Chlorobenzene	2.3		
Chloroethane	1.3		
Chloroform	2.5		
Chloromethane	4.2		
cis-1,2-Dichloroethene	2.0	1.59 E+04	4.44 E+04
cis-1,3-Dichloropropene	2.3		

TABLE I
LIST OF SOIL GAS VOCs BY EPA METHOD TO15
FORMER C-6 FACILITY
LOS ANGELES, CALIFORNIA

Air Toxics T015 List of VOCs	RLs (µg/m3)	Shallow Soil Gas Human Health Screening Levels (µg/m3)	
		Residential Land Use	Commercial/ Industrial Land Use
Cumene	2.5		
Cyclohexane	1.7		
Dibromochloromethane	4.3		
Ethanol	3.8		
Ethyl Benzene	2.2	4.9 E+02	1.6 E+03
Ethylene Dibromide (1,2-Dibromoethane)	3.9		
Freon 11 (Trichlorofluoromethane)	2.8		
Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane)	3.9		
Freon 114 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)	3.6		
Freon 12 (Dichlorodifluoromethane)	2.5		
Heptane	2.1		
Hexachlorobutadiene	21.7		
Hexane	1.8		
m,p-Xylene	2.2	3.19 E+05 /3.17 E+05	8.87 E+05
Methyl t-Butyl Ether (MTBE)	1.8	4.00 E+03	1.34 E+04
Methylene Chloride	1.8		
Naphthalene	10.0	3.19 E+01	1.06 E+02
o-Xylene	2.2	3.15 E+05	8.79 E+05
Propylbenzene	2.5		
Styrene	2.2		
Tetrachloroethene	3.4	1.80 E+02	6.03 E+02
Tetrahydrofuran	1.5		
Toluene	1.9	1.35 E+05	3.78 E+05
trans-1,2-Dichloroethene	2.0	3.19 E+04	8.87 E+04
trans-1,3-Dichloropropene	2.3		
Trichloroethene	2.7	5.28 E+02	1.77 E+03
Vinyl Chloride	1.3	1.33 E+01	4.48 E+01
1,1-Difluoroethane (1,1-DFA) - Leak Check Compd	5.4		

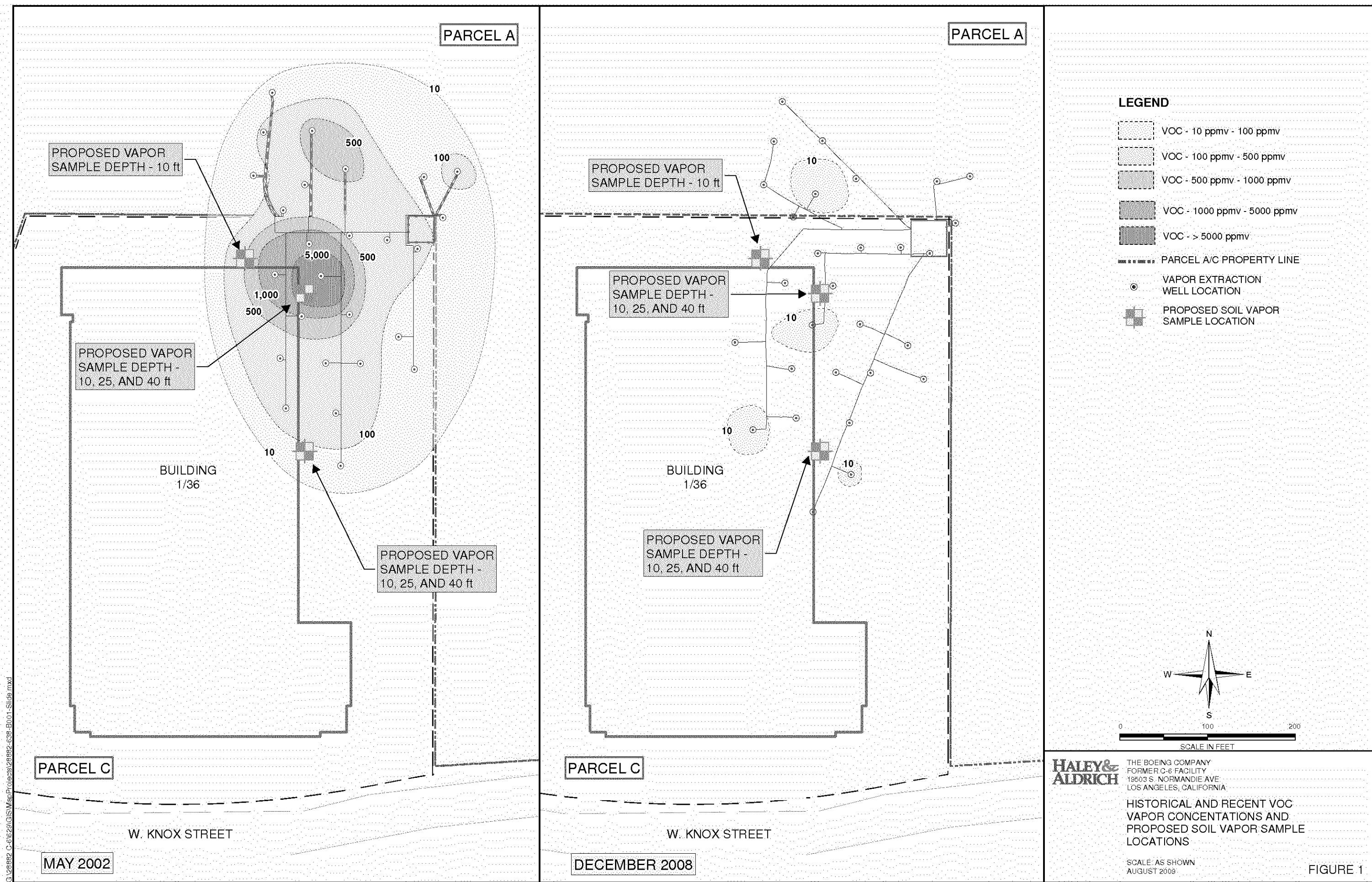
1,1,1,2-Tetrachloroethane

=

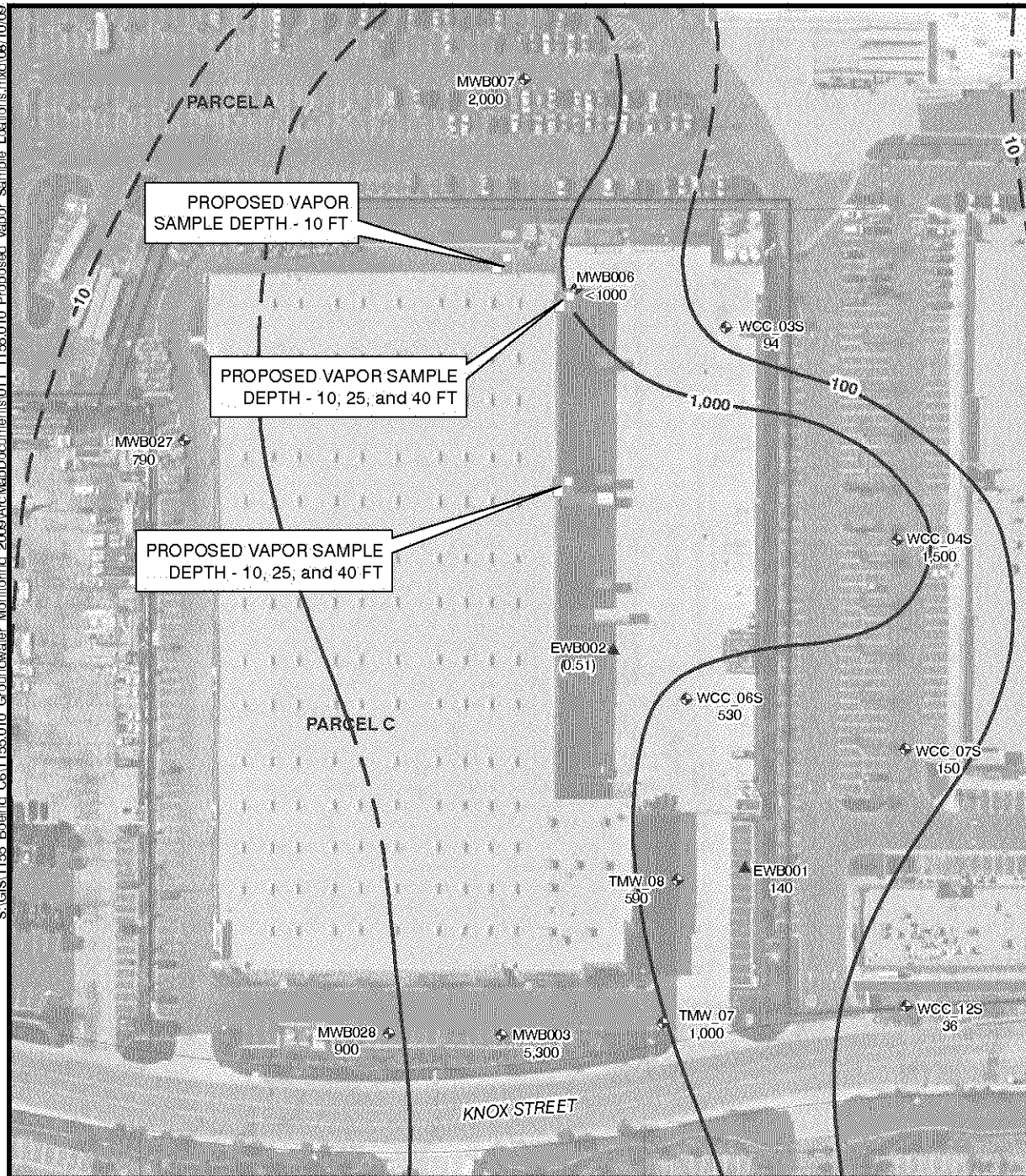
23 primary and three (3) of the other target VOCs (MEK, MIBK, and Ethylene Dibromide) identified in the LARWQCB ASGI (dated February 25, 1997). Also includes MTBE and Naphthalene

RLs - Reporting Limits

µg/m3 - micrograms per cubic meter



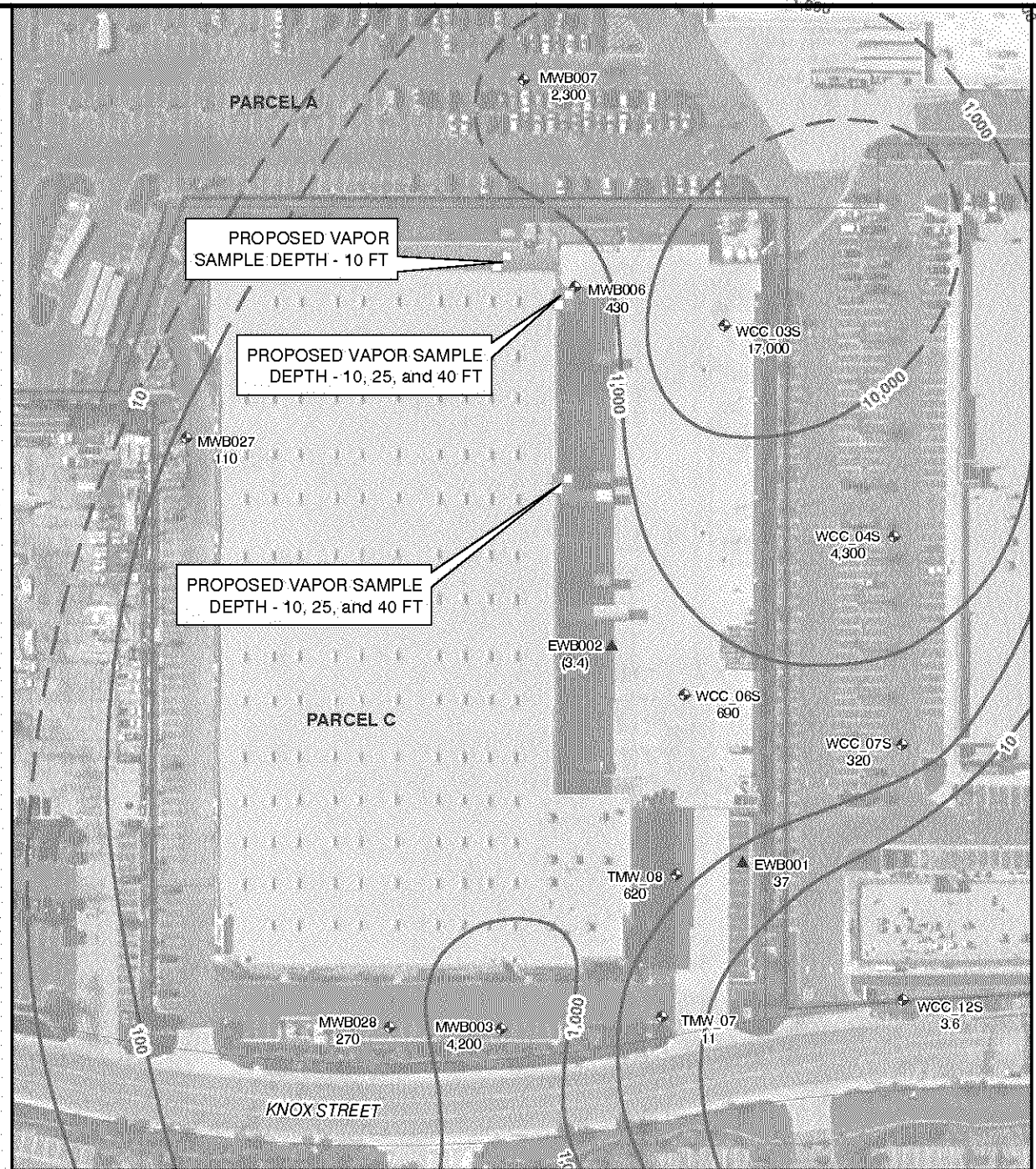
S:\GIS\1155 BoeIng C6\1155.010 Groundwater Monitoring 2009\ArcMapDocuments\01.1 1155.010 Proposed Vapor Sample Locations.mxd\08.10.09



LEGEND

- Proposed Soil Vapor Sample Location
- B-Sand IRZ Bioremediation Monitoring Well
- B-Sand Montrose Monitoring Well
- B-Sand Monitoring Well
- B-Sand Observation Well
- 150 TCE Concentration in Groundwater in ug/L
- (450) Indicates TCE Concentration Not Used in Contouring
- 10 TCE Isoconcentration Contour in ug/L
- Parcel Boundary

NOTE: TCE AND 1,1-DCE CONTOURS
DATED MARCH 2009.



LEGEND

- Proposed Soil Vapor Sample Location
- B-Sand IRZ Bioremediation Monitoring Well
- B-Sand Montrose Monitoring Well
- B-Sand Monitoring Well
- B-Sand Observation Well
- 150 1,1-DCE Concentration in Groundwater in ug/L
- (450) Indicates 1,1-DCE Concentration Not Used in Contouring
- 10 1,1-DCE Isoconcentration Contour in ug/L
- Parcel Boundary

FIGURE 2

TRICHLOROETHENE AND 1,1-DICHLOROETHENE CONCENTRATIONS IN GROUNDWATER AND PROPOSED SOIL VAPOR SAMPLE LOCATIONS

THE BOEING COMPANY
FORMER C-6 FACILITY
LOS ANGELES, CALIFORNIA



